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12 January 1998

Mr. Robert Butler
Department of Environmental Conservation
Waste Management Division
West Building, 103 South Main Street
Waterbury, Vermont 05671-0404

RE: Initial Site Investigation Report,
Ville Garage, Lyndonville, VT

Dear Mr. Butler,

Enclosed one bound copy of the Initial Site Investigation Report for Ville Garage, located in Lyndonville, Vermont. This report outlines the findings of the expressway investigation completed in December 1997.

Please contact me or Ron Miller, Regional Manager, if you have any questions or comments regarding this report.

Sincerely,

Robert J. Ross, CGWP
Hydrogeologist

enclosure

cc: Bob Williams, Ville Garage

Ref: 97091C02.DOC

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INITIAL SITE INVESTIGATION REPORT

VILLE GARAGE
67 Broad Street
Lyndonville, Vermont

30 December, 1997

Prepared for:

Robert Williams
P.O. Box 316
West Burke, VT 05871
Phone: 802-467-3027

Prepared by:

Marin Environmental, Inc.
1700 Hegeman Avenue
Colchester, Vermont 05446
Contact: Robert J. Ross
Phone: 802-655-0011

MARIN Project #V97-091

MARIN Document #: 97091R01.DOC

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Marin Environmental, Inc. (MARIN) has conducted an initial site investigation of subsurface petroleum contamination at the Ville Garage in Lyndonville, Vermont. Field investigations included the installation of one UST-excavation monitoring well and five drilled soil borings/monitoring wells, field screening of subsurface soils for the presence of volatile organic compounds (VOCs), sampling and analysis of ground water from the monitoring wells, and a site survey for the purposes of identifying and assessing potential risks to the environment and human health.

MARIN's conclusions are summarized as follows:

- Gasoline appears to have been released to the subsurface at the site. Soils in the vicinities of the removed USTs and the pump island had elevated photoionization detector (PID) readings.
- Gasoline compounds were detected in ground water beneath the site at levels significantly above Vermont Ground Water Enforcement Standards.
- The distribution of dissolved-phase gasoline in ground water suggests that both of the former UST locations and the pump island are sources of contamination. The presence of the gasoline additive MTBE in wells adjacent to former USTs #2 and #3 and the pump island suggests that gasoline in this area of the site was released after 1980.
- The downgradient extent of ground-water contamination has not been determined. The farthest downgradient wells, installed along the western property boundary, contained gasoline compounds at levels significantly above Vermont Ground Water Enforcement Standards.
- Adsorbed-phase soil contamination in the vicinity of the former USTs and pump island locations may represent a continuing source of ground-water contamination.
- No impacts have been observed to any identified sensitive receptors. However, the subsurface contamination may pose a risk to indoor air quality in the buildings located on the west side of Broad Street. Underground utility lines along the site western boundary represent a potential preferred contaminant-migration pathway for contaminant migration. No drinking-water supplies appear to be threatened; the site and surrounding properties are supplied with drinking water from a municipal system.
- The unconsolidated surficial materials comprising the shallow soil aquifer at the site consist predominantly of fine sand and silt. On 26 October 1997, the water table was found to be between three and five feet below ground surface and to exhibit a westerly-trending gradient of six percent. Ground-water flow velocities are expected to be between 0.4 to 21 feet per day.

On the basis of the results of this investigation, MARIN recommends the following:

1. Complete a soil-gas survey to determine the downgradient extent of subsurface petroleum contamination on the west side of Broad Street and on the abutting property to the south.
2. Install additional soil borings/monitoring wells, based on the findings of the soil-gas survey, to define the extent of ground-water contamination. At this time, MARIN anticipates that up to six additional soil borings/monitoring wells may be required.
3. Collect and analyze water samples from all monitoring wells and from the storm-water catch basin located approximately 10 feet north of MW-4.
4. Conduct PID monitoring of ambient air in the three downgradient properties on the west side of Broad Street during the next site visit.
5. Conduct semi-annual PID monitoring of the on-site soil stockpile, to verify that contaminant concentrations are declining and that the cover integrity is maintained.

1.0 INTRODUCTION

This report details the results of an initial site investigation of subsurface petroleum contamination at the Ville Garage, located on Broad Street in the town of Lyndonville, Vermont. This report has been prepared by Marin Environmental, Inc. (MARIN) for Robert Williams, owner of the Ville Garage. The site investigation was initiated with Vermont Department of Environmental Conservation (VT DEC) approval under the State's "expressway" notification process following the discovery of subsurface petroleum contamination during the removal of three gasoline underground storage tanks (USTs); a 10,000-gallon tank (UST #1), a 6,000-gallon tank (UST #2), and a 4,000-gallon tank (UST #3).

1.1 Site Location and Physical Setting

The site is located on the east side of Broad Street approximately 0.3 miles south the village of Lyndonville (Figure 1, Appendix A). Property in the area is zoned for mixed residential and commercial development. The site is bounded to the north by Fred's Propane, to the east by an undeveloped parcel of land, and to the south by a restaurant, (the Miss Vermont Diner). Broad Street (Route 5) forms the western boundary of the site, with several commercial business located across the road; The Feed Exchange, a laundromat, and Caledonia Auto Parts. Drinking water and sewer service are supplied to the site and surrounding buildings by municipal systems. The main trunk of the municipal water line for the area parallels the east side of Broad Street. No private or public water supply wells were observed near the site. One floor drain, which reportedly is connected to the municipal sanitary sewer system, is located in the garage of the service station. Also, one storm-water catch basin is located along the western property boundary, approximately 10 feet north of MW-4. Photographs of the site and surrounding properties are included in appendix B.

The average elevation of the ground surface is approximately 720 feet above mean sea level. Surface drainage and presumed ground-water flow direction in the area follow the topographic slope toward the Passumpsic River, whose closest point is approximately 1,300 feet west of the site (USGS, 1986).

Native surficial materials in the vicinity of the site are mapped as fluvial sands and gravels, and well sorted littoral sands (Stewart and MacClintock, 1970). The Waits River Formation comprises bedrock in the area, and consists of gray quartzose and micaceous crystalline limestone of Lower Devonian age (Doll, 1961). No bedrock outcrops were observed on or near the site.

1.2 Site History

The site is currently a convenience store, gasoline retail outlet, and automotive service station owned by Robert Williams. Mr. Williams purchased the property in 1977 from Wendall Maston. According to Mr. Williams, Wendall Maston had owned the property since the mid-1950s, at which time Mr. Maston constructed the building and installed two gasoline USTs (3,000-gallon and 4,000-gallon tanks) on the northern portion of the site. In 1983, Mr. Williams replaced the original USTs with 4,000-gallon and 6,000-gallon gasoline tanks and in 1985 installed a 10,000-gallon gasoline UST. No report was

available regarding the 1983 UST removal or possible subsurface petroleum contamination that may have been present at that time.

On 22 September 1997, the three 1980 era gasoline USTs were removed by Fred's Plumbing and Heating with the assistance of Gosselin's Excavating, both of Derby, Vermont; a 10,000-gallon tank (UST #1), a 6,000-gallon tank (UST #2), and a 4,000-gallon tank (UST #3). A MARIN field scientist performed an UST closure assessment on the day of removal, and submitted a report, dated 29 September 1997, to Mr. Williams and the VT DEC. The approximate locations of the USTs removed on 22 September 1997 are shown in Figure 2 in Appendix A.

All three USTs were found to be in very good condition upon removal with some surface rust, but no apparent pitting or holes. Associated fill, suction-line, and vent-line piping systems for all three USTs were in very good condition at the time of the closure assessment. Soils in the UST #1 excavation consisted of sand and gravel backfill to a depth of approximately nine feet bgs. Petroleum odors, characteristic of an older release, were noted throughout the excavation. The soils in the UST #2 and UST #3 excavation consisted of a medium sand, stained a dark gray from apparent petroleum saturation. Strong petroleum odors were noted throughout the UST #2 and UST #3 excavation. Ground water was encountered in both excavations at a depth of seven feet bgs, with heavy sheening in the UST #2 and UST #3 excavation.

Photoionization detector (PID) readings on soil samples collected from the UST #1 excavation ranged from 0.0 to 56 parts per million (ppm), with an average of 10.4 ppm. The highest PID readings in this excavation were noted at the west end of UST #1 at a depth of nine feet bgs. PID readings on soil samples collected from the UST #2 and UST #3 excavation ranged from 1.7 to 1,278 ppm, with an average of 387 ppm. The highest PID readings from this excavation were observed on soil samples collected on the west side of UST #2 at a depth of eight feet bgs. The soil contamination extended to ground water, which was encountered at seven feet bgs. Approximately 20 cubic yards of petroleum contaminated soil were stockpiled on-site due to accommodate the installation of a new UST.

MARIN initiated a site investigation in accordance with VT DEC "expressway" process after receiving approval from Mr. Williams on 29 September 1997.

1.3 Objectives and Scope of Work

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soil and ground water;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and
- Identify potentially appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these objectives, MARIN has:

- Reviewed existing historical site data;
- Supervised the installation of one UST-excavation well (MW-1) and five drilled soil borings/monitoring wells (MW-2, MW-3, MW-4, MW-5, and MW-6), and determined the local ground-water flow direction, gradient, approximate velocity and contaminant distribution;
- Screened subsurface soils from the well borings for VOC content using a PID;
- Collected and submitted ground-water samples from the on-site monitoring wells for laboratory analysis of volatile petroleum compounds;
- Identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors;
- Evaluated the need for treatment and/or a long-term monitoring plan for the site; and
- Prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions and offers recommendations for further action.

2.0 INVESTIGATIVE PROCEDURES AND RESULTS

2.1 Soil Boring / Monitoring Well Installation

In order to evaluate the degree of contamination in the three possible on-site source areas, monitoring wells were installed at both of the former UST locations and adjacent to the pump island. MW-1 was installed in the UST #2 and # 3 excavation, MW-3 was installed in the presumed downgradient direction from the pump island, and MW-5 was installed in the UST #1 excavation. Two other monitoring wells were installed downgradient of the UST excavations (MW-2 and MW-4), and one monitoring well was installed upgradient of the site (MW-6). Approximate well locations are shown on Figure 2 in Appendix A; well construction details are presented in Appendix C.

The soils encountered in borings MW-2, MW-3, and MW-6, completed on the northern portion of the site, generally consisted of brown medium to fine sand and silt down to about 12 feet below ground surface (bgs), underlain by dark brown organic material and gray clay. Soils encountered in borings MW-4 and MW-5, located on the southern portion of the property, consisted of alternating layers of organic material, silty sand and gray clay down to 20 feet bgs, underlain by coarse sand and gravel. Ground water was encountered in each of the borings at approximately 11 feet bgs.

The monitoring wells were installed by Tri-State Drilling and Boring of West Burke, Vermont using the hollow-stem auger (HSA) drilling method. Soil samples were collected at five-foot intervals from each boring using a standard split-spoon barrel. Sample recovery was fair to good, generally ranging from 25 to 80 percent. The samples obtained were screened for the possible presence of VOCs with a photoionization detector (PID)

and logged for lithology by a MARIN field geologist. All downhole drilling and sampling equipment was decontaminated during use as appropriate.

All of the monitoring wells were developed by hand using dedicated bailers. None of the wells contained free-phase product during development, although MW-1, MW-2 and MW-3 had petroleum sheens and exhibited strong petroleum odors. Development water was discharged directly to the ground surface in the vicinity of each well.

2.2 Soil-Screening Results

PID field-screening results of soil samples collected from the UST excavation and the five soil borings indicate that significant residual soil contamination exists down to the water table in the vicinity of the former gasoline USTs and around the pump island.

Although approximately 20 cubic yards of soil were excavated from the UST #2 and #3 excavation to permit the installation of the new gasoline UST, PID readings at the limits of excavated soils were still greater than 1,000 ppm. PID readings on soils from the MW-2 boring, located immediately downgradient from the UST #2 and #3 excavation, were between 32.4 and 1,008 ppm. PID readings on soils from the boring for MW-3, located approximately 12 feet downgradient of the pump island, ranged from 9.6 to 1,040 parts per million (ppm). Lower but still elevated PID readings (1.8 - 261 ppm) were measured on soils from MW-4, located approximately 40 feet downgradient of the UST #1 excavation. PID readings on soils from the MW- 5 boring were considerably lower, ranging from 1.1 to 5.5 ppm and the PID readings on soils from the MW- 6 boring, which is upgradient of the former USTs and pump island, were all 0.0 ppm. The highest PID readings were generally measured at or near the water table, which was encountered between 5 and 7 feet bgs. PID screening results are included on the boring logs in Appendix C.

The MARIN field geologist screened soil samples from each soil boring for the presence of volatile organic compounds (VOCs) using a PE PhotoVac model 2020 portable photoionization detector (PID). The PID was calibrated with an isobutylene standard gas to a benzene reference.

2.3 Determination of Ground-Water Flow Direction and Gradient

Ground water in the unconfined surficial aquifer directly beneath the site appears to be flowing in an westerly direction, as originally presumed. The average gradient of the local ground-water table on 26 October 1997 was approximately six percent. Average flow velocities in the ground water are estimated to be on the order of 0.4 to 21 feet per day. Water-level measurements and elevation calculations are presented in Table 1. The ground-water contour map (Figure 3, Appendix A) was prepared using this data.

The depth to water varied from 6.23 feet (MW-5) to 8.36 feet (MW-4) below top-of-casing. No free-phase petroleum was observed in any of the wells; however, each well, except MW-6, exhibited a strong petroleum odor. Static water-table elevations were computed for each monitoring well by subtracting the measured depth-to-water readings

from the surveyed top-of-casing elevations, which are relative to an arbitrary site datum of 100.00 feet.

The sandy soils comprising the shallow aquifer at the site typically exhibit effective porosities of about 0.3 to 0.4, with hydraulic conductivities ranging between 2.5 and 140 feet per day (Fetter, 1994). Assuming Darcian flow, these estimated combine with the calculated ground-water gradient of six percent to yield an estimated range of ground-water flow velocities in the surficial aquifer of between 0.4 and 21 feet per day.

Table 1. Ground-Water Elevation Data
Monitoring Date: 26 October 1997

Well I.D.	Top of Casing Elevation	Depth to Water (feet, bgs)	Water-Table Elevation
MW-1	98.74	8.21	90.53
MW-2	98.62	7.63	90.99
MW-3	98.57	7.51	91.06
MW-4	98.20	8.36	89.84
MW-5	97.62	6.23	91.39
MW-6	100.00	8.33	91.67

2.4 Ground-Water Sampling and Analysis

Ground-water analytical results indicate that ground water in the shallow soil aquifer beneath the site is contaminated with gasoline compounds, and that the contaminated ground-water is migrating off-site toward the west and southwest. The nature and distribution of petroleum contamination at the site suggest that the principal source areas are the former gasoline pump island and former USTs #2 and #3, but that gasoline releases have also occurred in the vicinity of former UST #1. Analytical results are summarized in Table 2, a contaminant distribution map is presented as Figure 4, and laboratory report forms are included in Appendix D.

One or more of the Vermont Ground-Water Enforcement Standards (VGESs)[1] for volatile petroleum compounds were exceeded in each monitoring well, except MW-6. Exceedances of the VGESs are highlighted on Table 2.

Methyl-tertiary butyl ether (MTBE), an octane-boosting gasoline additive, was detected above the VGES in MW-1, MW-2, and MW-3, at concentrations ranging from 2,510 to 12,500 ppb. A replacement for tetra-ethyl lead, MTBE has been in widespread use in gasoline since about 1980. The apparent absence of MTBE in MW-4 and MW-5, located in the vicinity of UST #1, suggests the contamination in that area of the site may be associated with an older release; however, the detection limits for the MW-4 and MW-5 samples were high (500 and 100 ppb, respectively) due to sample dilution for analysis.

[1]The Vermont DEC has established Groundwater Enforcement Standards (VGESs) for five petroleum related VOCs, as follows: benzene - 5 ppb; toluene - 1,000 ppb; ethylbenzene - 700 ppb; xylenes - 10,000 ppb; and MTBE, a gasoline additive, - 40 ppb.

Table 2. Ground-Water Analytical Results
Monitoring Date: 26 October 1997

Well I.D.	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	MTBE
MW-1	942	1,730	1,390	8,040	12,102	12,500
MW-2	9,250	20,900	3,120	18,000	51,270	2,510
MW-3	6,520	3,840	605	3,510	14,475	2,710
MW-4	3,170	126	268	1,000	4,564	ND <500
MW-5	502	26.9	29.0	266	8,23.9	ND <100
MW-6	ND <1	ND <1	ND <1	ND <1	ND <1	ND <10
Dup MW-1	1,110	1,990	1,580	8,990	13,660	12,500
Trip Blank	ND <1	ND <1	ND <1	ND <1	ND <1	ND <10
VGES	**5.0**	**1,000**	**700**	**10,000**	**---**	**40**

Note: Shaded areas denote an exceedance of the corresponding VGES.

Ground-water samples were collected from the six on-site monitoring wells on 26 October 1997. Each monitoring well was purged and then sampled using dedicated bailers and dropline. Trip blank and duplicate samples were collected to ensure that adequate quality assurance/quality control (QA/QC) standards were maintained. All field procedures were conducted in accordance with MARIN standard protocols. Purge water was discharged directly to the ground in the vicinity of each well.

The ground-water samples were submitted to Endyne, Inc. of Williston, Vermont where they were analyzed for the possible presence of volatile petroleum compounds by U.S. EPA Method 8020. Analytical results from the QA/QC samples indicate that adequate QA/QC was maintained during sample collection and analysis; no VOCs were detected in the trip-blank, and analytical results for the blind field duplicate fell within about 15 percent of the original sample results (Table 2).

3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT

MARIN conducted a survey to identify sensitive receptors in the vicinity of the site that could potentially be impacted. The following sensitive receptors were identified.

- Three off-site buildings on the west side of Broad Street are downgradient of the site and may have basements through which vapors could enter.
- The nearest surface-water body is the Passumpsic River, whose closest point to the site is approximately 1,300 feet to the west.
- One storm-water catch basin is located along the western site boundary, approximately 10 feet north of MW-4. This catch basin is located within the ground-water contaminant plume.

- Municipal water and sewer lines also cross the contaminant plume within 20 feet west of the recently removed gasoline USTs and pump island. Contaminant vapors could preferentially follow these lines and accumulate in manholes.

On the basis of the information obtained during this investigation, MARIN has qualitatively assessed the risks that the subsurface contamination poses to human health and the environment. Our findings are as follows:

- When screened on 7 October 1997, no elevated PID readings were observed in the on-site storm-water catch basin.
- The risks posed by on-site contamination to indoor air quality in the building basements on the west side of Broad Street could not be adequately evaluated at this time, because the site access was not obtained. However, according to Mr. Williams, the buildings located on the west side of Broad Street are constructed on at-grade slab foundations, and do not have basements.
- The risks posed by on-site contamination to water quality in the Passumpsic River could not be adequately evaluated, because the downgradient extent of subsurface contamination has not been determined.
- The risk of human exposure through direct contact with residual petroleum-contaminated soils is considered to be very low, considering that all known contaminated soils are located beneath paved parking lots and roadways.
- The risk of ingestion of contaminated ground water appears to be very low. All drinking water used in the surrounding area is provided by the municipal system. No drinking-water supply wells were identified in the immediate vicinity of the site.
- The risk of vapor entry into water and sewer manholes has not been adequately evaluated.

4.0 CONCLUSIONS

Based on the results of the site investigation described above, MARIN concludes the following:

- Gasoline appears to have been released to the subsurface at the site. Soils in the vicinities of the removed USTs and the pump island had elevated photoionization detector (PID) readings.
- Gasoline compounds were detected in ground water beneath the site at levels significantly above Vermont Ground Water Enforcement Standards.
- The distribution of dissolved-phase gasoline in ground water suggests that both of the former UST locations and the pump island are sources of contamination. The presence of the gasoline additive MTBE in wells adjacent to former USTs #2 and #3 and the pump island suggests that gasoline in this area of the site was released after 1980.
- The downgradient extent of ground-water contamination has not been determined. The farthest downgradient wells, installed along the western property boundary, contained gasoline compounds at levels significantly above Vermont Ground Water Enforcement Standards.

- Adsorbed-phase soil contamination in the vicinity of the former USTs and pump island locations may represent a continuing source of ground-water contamination.
- No impacts have been observed to any identified sensitive receptors. However, the subsurface contamination may pose a risk to indoor air quality in the buildings located on the west side of Broad Street. Underground utility lines along the site western boundary represent a potential preferred contaminant-migration pathway for contaminant migration. No drinking-water supplies appear to be threatened; the site and surrounding properties are supplied with drinking water from a municipal system.
- The unconsolidated surficial materials comprising the shallow soil aquifer at the site consist predominantly of fine sand and silt. On 26 October 1997, the water table was found to be between three and five feet below ground surface and to exhibit a westerly-trending gradient of six percent. Ground-water flow velocities are expected to be between 0.4 to 21 feet per day.

5.0 RECOMMENDATIONS

On the basis of the results of this investigation and the conclusions stated above, MARIN makes the following recommendations.

1. Complete a soil-gas survey to determine the downgradient extent of subsurface petroleum contamination on the west side of Broad Street and on the abutting property to the south.
2. Install additional soil borings/monitoring wells, based on the findings of the soil-gas survey, to define the extent of ground-water contamination. At this time, MARIN anticipates that up to six additional soil borings/monitoring wells may be required.
3. Collect and analyze water samples from all monitoring wells and from the storm-water catch basin located approximately 10 feet north of MW-4.
4. Conduct PID monitoring of ambient air in the three downgradient properties on the west side of Broad Street during the next site visit.
5. Conduct semi-annual PID monitoring of the on-site soil stockpile, to verify that contaminant concentrations are declining and that the cover integrity is maintained.

6.0 REFERENCES

Doll, C.G. and others, 1961. *Geologic Map of Vermont*, Office of the State Geologist.

Domenico, P.A., and Schwartz, F.W., 1990. *Physical and Chemical Hydrogeology*, John Wiley and Sons, New York, 824 p.

Fetter, C.W., 1994. *Applied Hydrogeology, 3rd Ed.*, Prentice Hall, Englewood Cliffs, New Jersey, 691 p.

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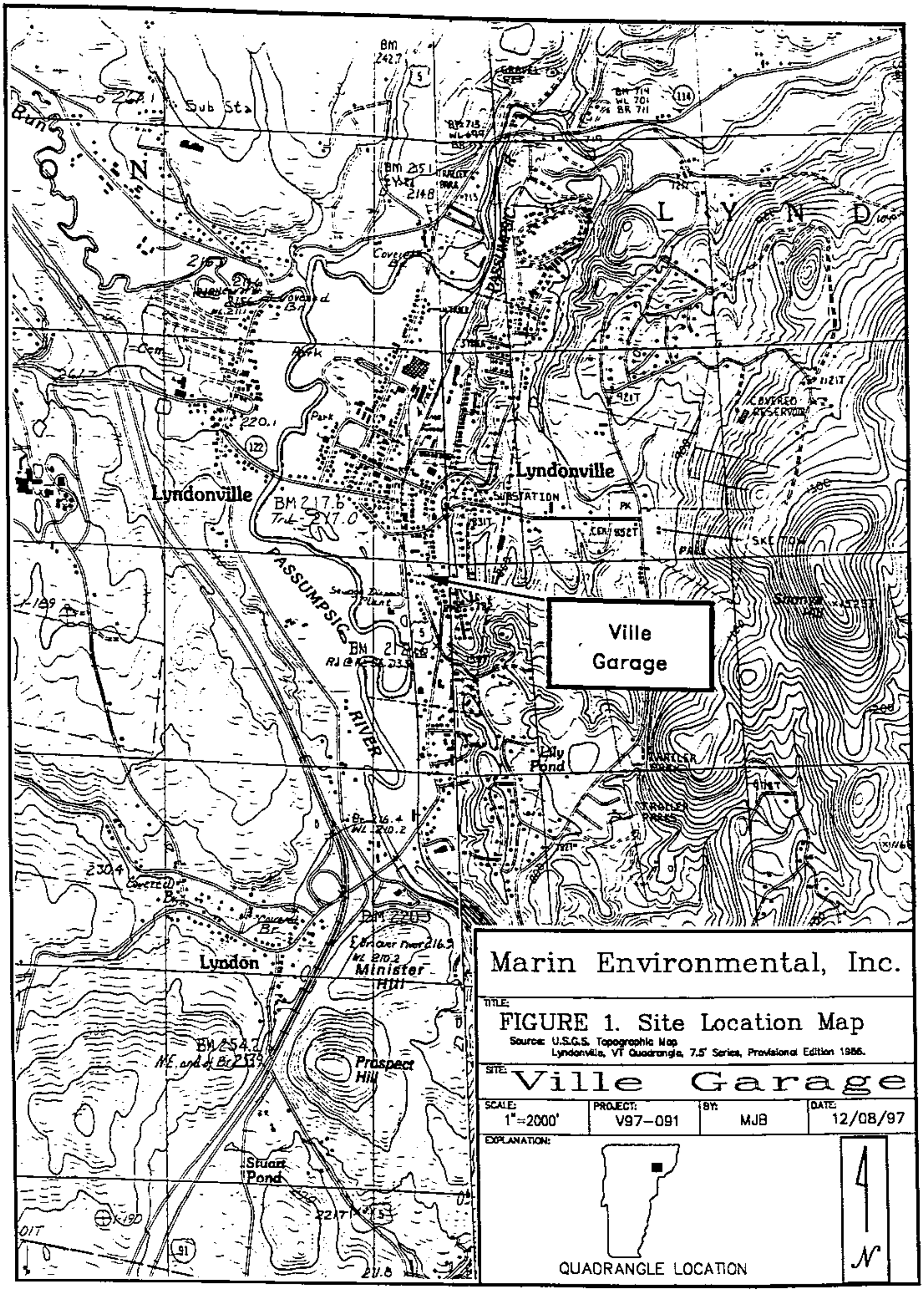
USGS, 1986. Lyndonville Quadrangle Vermont. U.S. Geological Survey. 7.5 minute series (topographic). Provisional Edition, 1986.

USGS, 1988. Burke Mountain Quadrangle Vermont. U.S. Geological Survey. 7.5 minute series (topographic). Provisional Edition, 1986.

APPENDIX A

Figures



Marin Environmental, Inc.

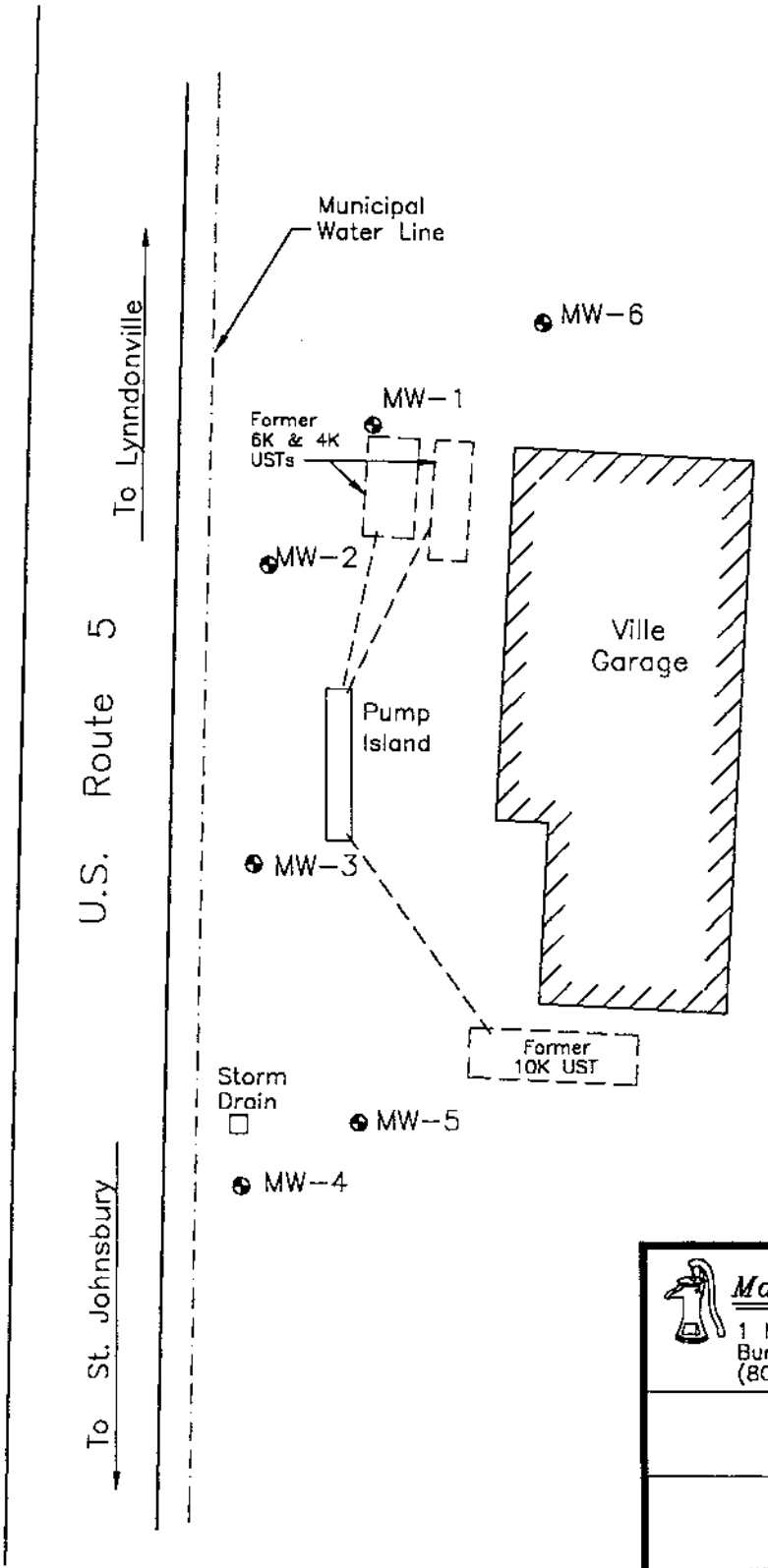
TITLE: FIGURE 1. Site Location Map

Source: U.S.G.S. Topographic Map Lyndonville, VT Quadrangle, 7.5' Series, Provisional Edition 1986.

SITE: Ville Garage

SCALE:	PROJECT:	BY:	DATE:
1"=2000'	V97-091	MJB	12/08/97

EXPLANATION:



0 30'

SCALE

ALL LOCATIONS ARE APPROXIMATE

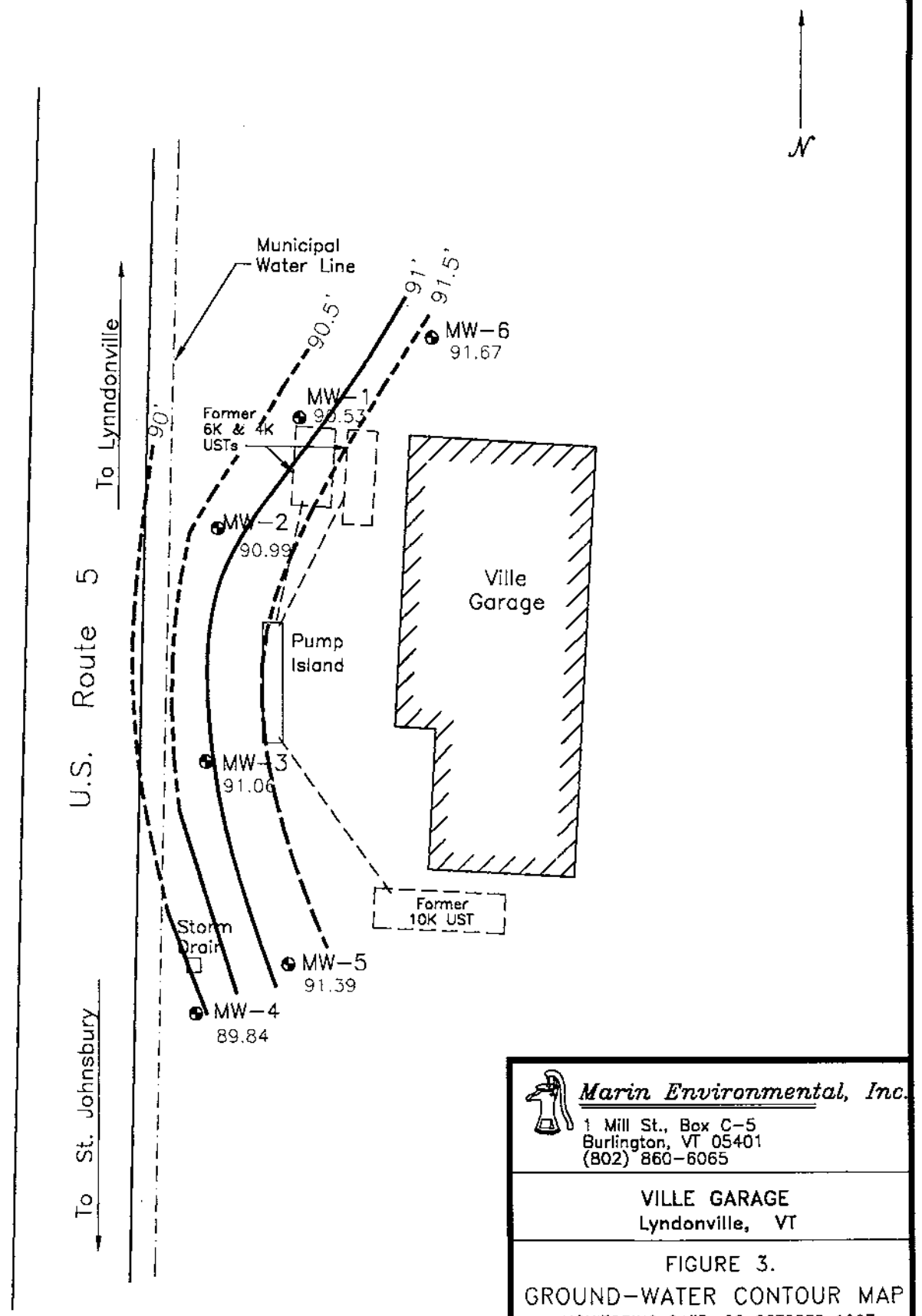
Marin Environmental, Inc.
1 Mill St., Box C-5
Burlington, VT 05401
(802) 860-6065

VILLE GARAGE
Lyndonville, VT

FIGURE 2.
SITE MAP
With Monitoring Well Locations

LEGEND:
Monitoring Well

DRAWN BY: MJB	DATE: DEC 97
APPROVED BY: BH	FILE No.: 97091



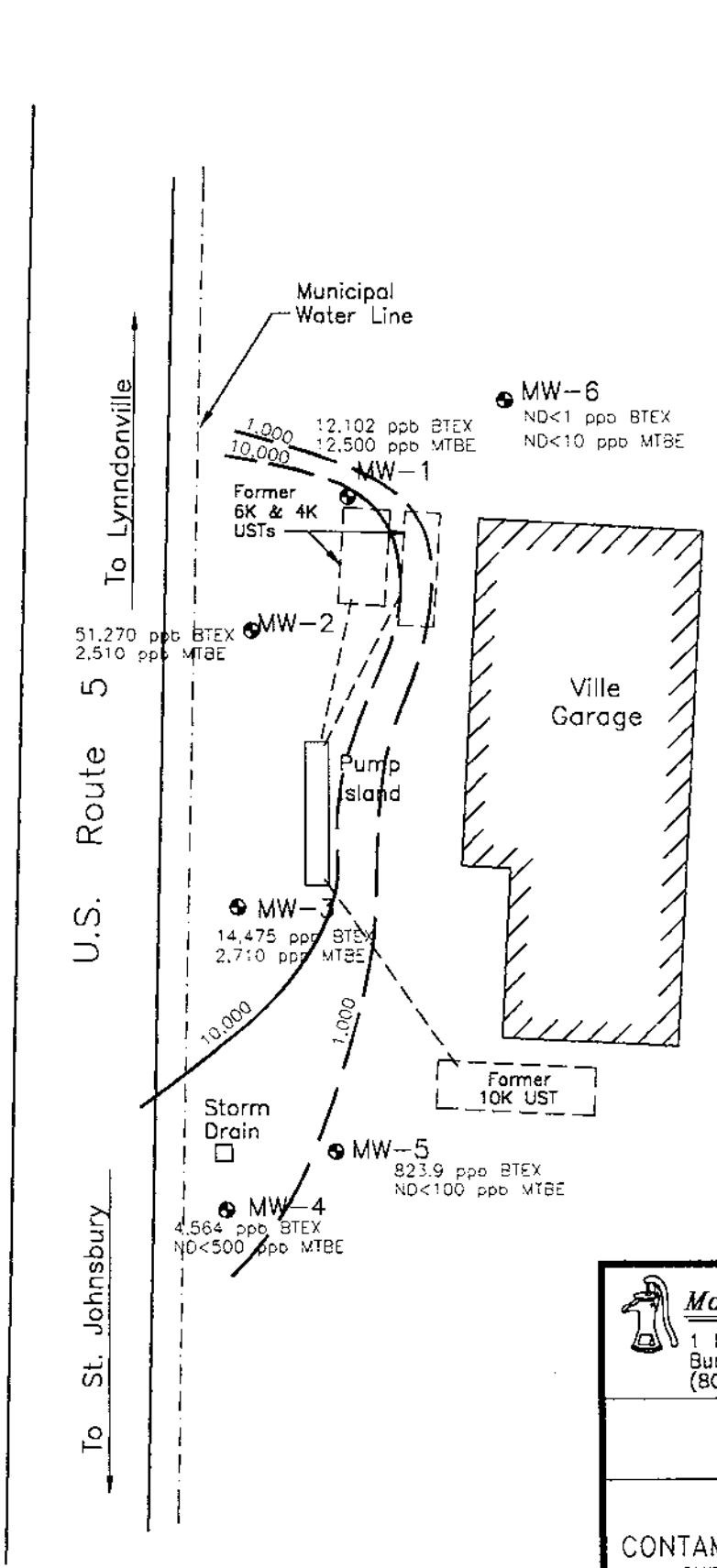
Marin Environmental, Inc.
1 Mill St., Box C-5
Burlington, VT 05401
(802) 860-6065

VILLE GARAGE
Lyndonville, VT

FIGURE 3.
GROUND-WATER CONTOUR MAP
MONITORING DATE: 26 OCTOBER 1997

LEGEND: GROUND-WATER CONTOUR
Monitoring Well

DRAWN BY: MJB	DATE: DEC 97
APPROVED BY: BH	FILE No.: 97091



0 30'

SCALE

ALL LOCATIONS ARE APPROXIMATE

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(802) 860-6065

VILLE GARAGE
Lyndonville, VT

FIGURE 4.
CONTAMINANT DISTRIBUTION MAP
MONITORING DATE: 26 OCTOBER 1997

LEGEND: ~~CON~~TAMINANT CONTOUR, BTEX ppb
Monitoring Well
ND NONE DETECTED

DRAWN BY: MJB	DATE: DEC 97
APPROVED BY: BH	FILE No.: 97091

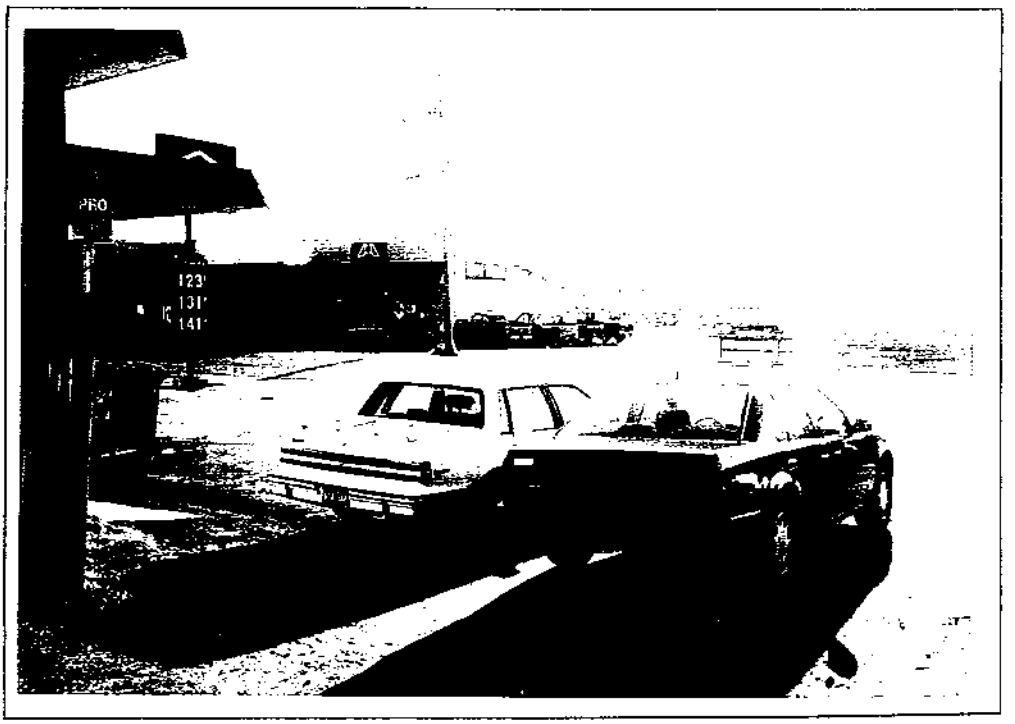
APPENDIX B

Photographs

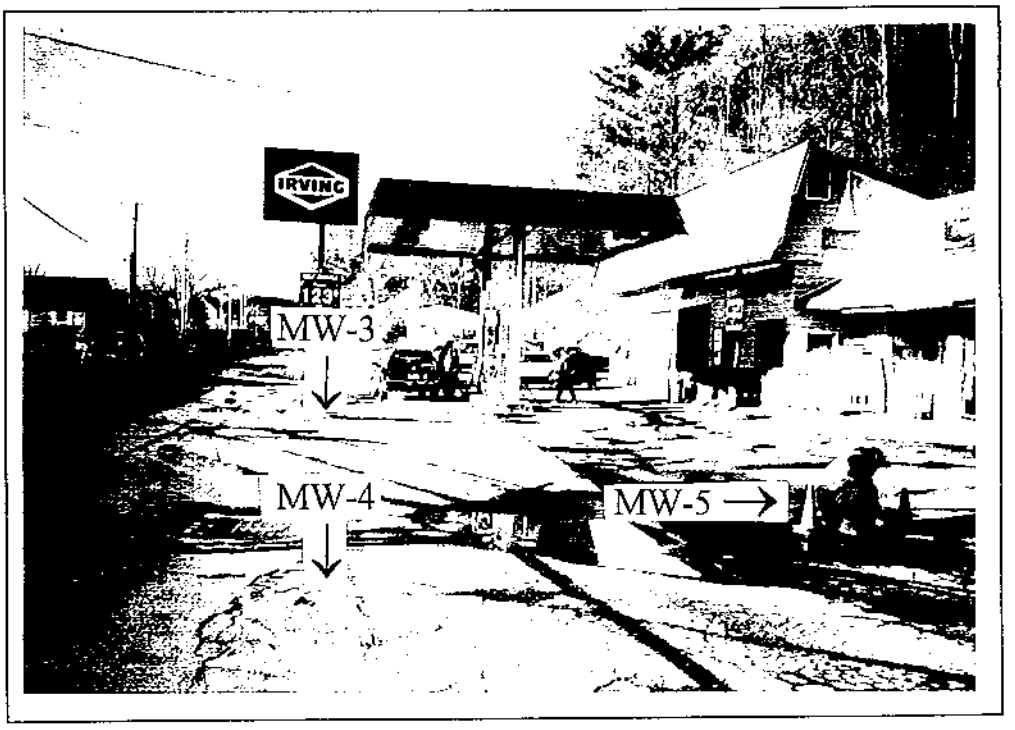
VIEW TOWARD THE WEST
(Laundromat Downgradient of MW-1)

VIEW TOWARD NORTHEAST
(The Feed Exchange)

VIEW TOWARD SOUTHEAST
(MW-6 Behind Black Sedan)



VIEW FROM MW-6 TOWARD SOUTHWEST
(Caledonia Auto Parts Downgradient of Site)



VIEW TOWARD NORTH
(Location of MW-3, MW-4 and MW-5)

VIEW TOWARD NORTHEAST
(Field Scientist at MW-5)

VIEW TOWARD EAST
(Site Overview)

VIEW TOWARD SOUTHWEST
(MW-1 and MW-2)

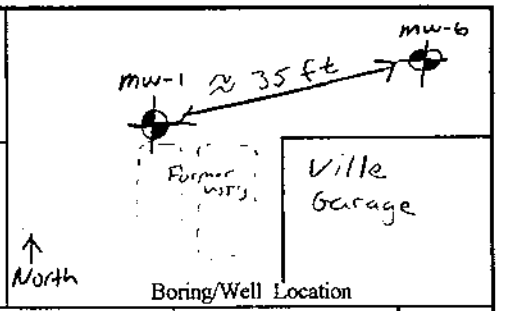
APPENDIX C

Soil Boring and Well Construction Logs

Marin Environmental, Inc.

SITE NAME:	Ville Garage
LOCATION:	Lyndonville, Vermont
JOB NO.	V97-091
DATE:	10/7/97
DRILLING METHOD	Excavator
BORING DIAMETER	

BORING NO:	MW-1
TOTAL DEPTH:	12 ft
DEPTH TO WATER:	11 ft
FIELD SUPERVISOR:	Jay Gonyaw
CONTRACTOR:	Mario Paul Excavation
DRILLERS:	

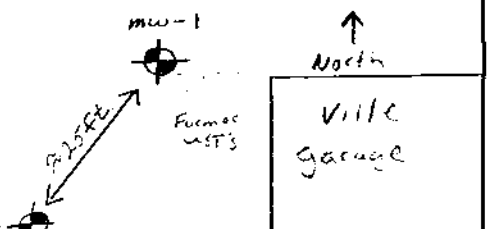


Depth	SN	BLOW COUNTS PER 6" 0-6	6-12	12-18	18-24	Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL	PID (ppm)
									1.7
							The well was installed in the excavation from the UST closure assesment. The backfilled material around the screen cosisted of a medium sand. PID readings ranged from 1.7 ppm at a depth of 1.5 feet, to 1,278 at a depth of 8 feet bgs.		
5'									
									1,278
10'									
15'									1,102
20'									
25'									
30'									
35'									
40'									

		BLOW COUNT		MATERIALS USED	SIZE/TYPE	QUANTITY
		0 - 4	VERY LOSE	WELL SCREEN	2" PVC	10 ft
AND	33-50%	4 - 10	LOOSE	SLOT SIZE	0.01"	10 ft
SOME	20-33%	10 - 30	MEDIUM	RISER	2" PVC	5 ft
LITTLE	10-20%	30 - 50	DENSE	GRADED SAND		
TRACE	0-10%	> 50	VERY DENSE	BENTONITE PELLETS		
				BENTONITE GROUT		

Marin Environmental, Inc.

SITE NAME:	Ville Garage	BORING NO:	MW-2
LOCATION:	Lyndonville, Vermont	TOTAL DEPTH:	17 ft
JOB NO.	V97-091	DEPTH TO WATER:	11 ft
DATE:	10/17/97		
DRILLING METHOD		FIELD SUPERVISOR:	Bruce Hamilton
4 1/4" Hollow Stem Auger			
BORING DIAMETER	9"	CONTRACTOR:	Tri-State Drilling and Boring
		DRILLERS:	Theron Faulkner



Boring/Well Location

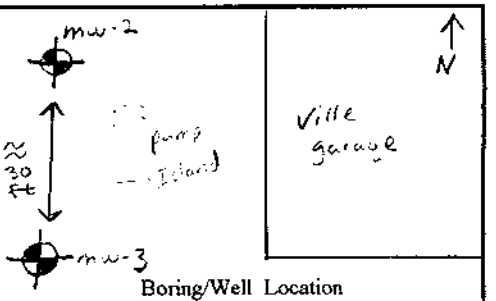
Depth	SN	BLOW COUNTS PER 6" 0-6	6-12	12-18	18-24	Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL	PID (ppm)
5'	SS-1	3	4	4	2	10/24	Coarse sand and gravel, Dry with strong petroleum odors		1,080
10'	SS-2	4	4	3	2	20/24	Medium silty sand, Wet with strong petroleum odors		246
15'	SS-3	1	1	2	1	22/24	Dark gray, medium to fine silty sand, Wet with a strong petroleum odor		32.4
20'									
25'									
30'									
35'									
40'									

		BLOW COUNT		MATERIALS USED	SIZE/TYPE	QUANTITY
AND	33-50%	0 - 4	VERY LOSE	WELL SCREEN	2" PVC	10 ft
SOME	20-33%	4 - 10	LOOSE	SLOT SIZE	0.01"	10 ft
LITTLE	10-20%	10 - 30	MEDIUM	RISER	2" PVC	5 ft
TRACE	0-10%	30 - 50	DENSE	GRADED SAND		3 Bags
		> 50	VERY DENSE	BENTONITE PELLETS		
				BENTONITE GROUT	Enviro Grout	0.5 Bags

Marin Environmental, Inc.

ITE NAME: Ville Garage
LOCATION: Lyndonville, Vermont
OB NO. V97-091
DATE: 10/7/97
DRILLING METHOD
4 1/4 Hollow stem Auger
BORING DIAMETER 9"

BORING NO: MW-3
TOTAL DEPTH: 15 ft
DEPTH TO WATER: 11 ft
FIELD SUPERVISOR: Bruce Hamilton
CONTRACTOR: Tri-State Drilling and Boring
DRILLERS: Tharon Fualkner



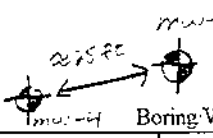
Depth	SN	BLOW COUNTS PER 6" (0-6 / 6-12 / 12-18 / 18-24)	Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL	PID (ppm)
5'	SS-1	6 / 4 / 5 / 6	10/24			1,040
				Medium sand and gravel with dark petroleum staining Moist with sheening on the soil with an odor		
10'	SS-2	3 / 2 / 1 / 3	14/24			26.9
				Medium sands, wet with a petroleum odor		
15'	SS-3	1 / 1 / 3 / 2	16/24			9.6
				Silty sands with organic debris, wet with a slight odor		
20'						
25'						
30'						
35'						
40'						

		BLOW COUNT		MATERIALS USED	SIZE/TYPE	QUANTITY
		0 - 4	VERY LOSE	WELL SCREEN	2" PVC	10 ft
AND	33-50%	4 - 10	LOOSE	SLOT SIZE	0.01"	10 ft
SOME	20-33%	10 - 30	MEDIUM	RISER	2" PVC	5 ft
LITTLE	10-20%	30 - 50	DENSE	GRADED SAND		3 Bags
TRACE	0-10%	> 50	VERY DENSE	BENTONITE PELLETS		
				BENTONITE GROUT	Enviro Grout	1/2 Bag

Marin Environmental, Inc.

ITE NAME:	Ville Garage
LOCATION:	Lyndonville, Vermont
OB NO.	V97-091
)ATE:	10/7/97
DRILLING METHOD	4 1/4 Hollow stem Auger
)ORING DIAMETER	9"

BORING NO:	MW-4
TOTAL DEPTH:	20 ft
DEPTH TO WATER:	11 ft
FIELD SUPERVISOR:	Bruce Hamilton
CONTRACTOR:	Tri-State Drilling and Boring
DRILLERS:	Tharon Fualkner



Boring/Well Location

Depth	SN	BLOW COUNTS PER 6" 0-6	6-12	12-18	18-24	Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL	PID (ppm)
	SS-1	3	1	2	4	6/24			261
							Dark brown sands with sands with organic debris. Wet with a petroleum odor		
10'									
	SS-2	2	3	2	2	20/24			4.5
							Dark grey sand, silt, and clay. Moist with no odor		
15'									
	SS-3	3	2	4	4	18/24			1.8
							Dark fine silty sands with organic debris. Wet with no odor.		
20'									
	SS-4	10	7	11	16	12/24			5.1
							Coarse sand and gravel. Wet with no odor.		
25'									
30'									
35'									
40'									

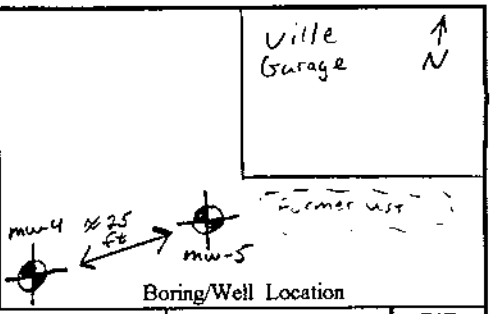
AND	33-50%
SOME	20-33%
LITTLE	10-20%
TRACE	0-10%

BLOW COUNT	
0 - 4	VERY LOSE
4 - 10	LOOSE
10 - 30	MEDIUM
30 - 50	DENSE
> 50	VERY DENSE

MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	2" PVC	10 ft
SLOT SIZE	0.01"	10 ft
RISER	2" PVC	5 ft
GRADED SAND		3 Bags
BENTONITE PELLETS		
BENTONITE GROUT	Enviro Grout	1/2 Bag

Marin Environmental, Inc.

SITE NAME:	Ville Garage
LOCATION:	Lyndonville, Vermont
JOB NO.	V97-091
DATE:	10/7/97
DRILLING METHOD	4 1/4 Hollow stem Auger
BORING DIAMETER	9"
BORING NO:	MW-5
TOTAL DEPTH:	15 ft
DEPTH TO WATER:	5.5 ft
FIELD SUPERVISOR:	Jay Gonyaw
CONTRACTOR:	Tri-State Drilling and Boring
DRILLERS:	Tharon Fualkner



Depth	SN	BLOW COUNTS PER 6" 0-6	6-12	12-18	18-24	Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL	PID (ppm)
5'	SS-1	2	2	7	6	0	The spoon had a petroleum odor, but no recovery.		
10'	SS-2	1	4	5	6	0	The spoon had a petroleum odor, but no recovery.		
	SS-3	2	2	3	1	16/24	Fine sands, wet with a slight petroleum odor.		5.5
	SS-4	4	3	2	2	18/24	Wet organic debris, with no odor.		1.7
15'	SS-5	2	2	2	1	14/24	Wet organic debris, with no odor.		1.1
20'									
25'									
30'									
35'									
40'									

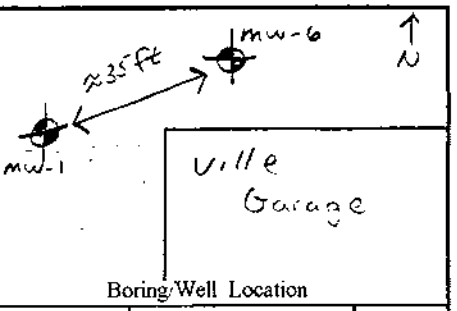
AND	33-50%
SOME	20-33%
LITTLE	10-20%
TRACE	0-10%

BLOW COUNT	
0 - 4	VERY LOSE
4 - 10	LOOSE
10 - 30	MEDIUM
30 - 50	DENSE
> 50	VERY DENSE

MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	2" PVC	10 ft
SLOT SIZE	0.01"	10 ft
RISER	2" PVC	5 ft
GRADED SAND		3 Bags
BENTONITE PELLETS		
BENTONITE GROUT	Enviro Grout	1/4 Bag

Marin Environmental, Inc.

SITE NAME:	Ville Garage
LOCATION:	Lyndonville, Vermont
JOB NO.	V97-091
DATE:	10/7/97
DRILLING METHOD	4 1/4 Hollow stem Auger
BORING DIAMETER	9"
BORING NO:	MW-6
TOTAL DEPTH:	15 ft
DEPTH TO WATER:	11 ft
FIELD SUPERVISOR:	Bruce Hamilton
CONTRACTOR:	Tri-State Drilling and Boring
DRILLERS:	Tharon Fualkner



Boring/Well Location

Depth	SN	BLOW COUNTS PER 6" (0 / 6 / 12 / 18 / 24)	Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL	PID (ppm)
5'	SS-1	1 / 0 / 1 / 1	20/24	Fine brown sands and dry with no petroleum odor.		0.0
10'	SS-2	2 / 2 / 3 / 3	19/24	Fine brown silty sands. Wet with no petroleum odor.		0.0
15'	SS-3	3 / 4 / 4 / 4	20/24	Fine brown/grey silty sands. Wet with no petroleum odor.		0.0
20'						
25'						
30'						
35'						
40'						

		BLOW COUNT		MATERIALS USED	SIZE/TYPE	QUANTITY
		0 - 4	VERY LOSE	WELL SCREEN	2" PVC	10 ft
AND	33-50%	4 - 10	LOOSE	SLOT SIZE	0.01"	10 ft
SOME	20-33%	10 - 30	MEDIUM	RISER	2" PVC	5 ft
LITTLE	10-20%	30 - 50	DENSE	GRADED SAND		3 Bags
TRACE	0-10%	> 50	VERY DENSE	BENTONITE PELLETS		
				BENTONITE GROUT	Enviro Grout	1/2 Bag

APPENDIX D

Laboratory Report Forms

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Marin Environmental
PROJECT NAME: Ville Garage
CLIENT PROJ. #: V97085

DATE RECEIVED: October 27, 1997
REPORT DATE: November 5, 1997
PROJECT CODE: GWVT1059

Ref. #:	112,135	112,136	112,137	112,138	112,139
Site:	Duplicate	Trip Blank	MW-1	MW-2	MW-3
Date Sampled:	10/26/97	10/26/97	10/26/97	10/26/97	10/26/97
Time Sampled:	NI	6:00	9:40	10:00	10:22
Sampler:	J. Gonyaw	J. Gonyaw	J. Gonyaw	J. Gonyaw	J. Gonyaw
Date Analyzed:	10/31/97	10/30/97	10/31/97	11/3/97	11/4/97
UIP Count:	4	0	4	8	4
Dil. Factor (%):	0.2	100	0.2	0.5	1
Surr % Rec. (%):	86	88	88	92	89
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Benzene	1,110.	<1	942.	9,250.	6,520.
Chlorobenzene	<500	<1	<500	<200	<100
1,2-Dichlorobenzene	<500	<1	<500	<200	<100
1,3-Dichlorobenzene	<500	<1	<500	<200	<100
1,4-Dichlorobenzene	<500	<1	<500	<200	<100
Ethylbenzene	1,580.	<1	1,390.	3,120.	605.
Toluene	1,990.	<1	1,730.	20,900.	3,840.
Xylenes	8,990.	<1	8,040.	18,000.	3,510.
MTBE	12,500.	<10	12,500.	2,510.	2,710.

Ref. #:	112,140	112,141	112,142		
Site:	MW-4	MW-5	MW-6		
Date Sampled:	10/26/97	10/26/97	10/26/97		
Time Sampled:	10:45	11:00	9:15		
Sampler:	J. Gonyaw	J. Gonyaw	J. Gonyaw		
Date Analyzed:	10/31/97	10/31/97	11/3/97		
UIP Count:	7	>10	0		
Dil. Factor (%):	2	10	100		
Surr % Rec. (%):	86	85	96		
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)		
Benzene	3,170.	502.	<1		
Chlorobenzene	<50	<10	<1		
1,2-Dichlorobenzene	<50	<10	<1		
1,3-Dichlorobenzene	<50	<10	<1		
1,4-Dichlorobenzene	<50	<10	<1		
Ethylbenzene	268.	29.0	<1		
Toluene	126.	26.9	<1		
Xylenes	1,000.	266.	<1		
MTBE	<500	<100	<10		

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated